FIG.1

BIPEDAL WALKING ROBOT

20

21 — INCLINATION SENSOR

22 — CPU

23 — RADIO COMMUNICATION PART

100 — COMMUNICATION NETWORK

REMOTE MANIPULATION DEVICE

10

11 — TREADMILL

12 — SERVO CONTROLLER

13 — D/A

14 — ENCODER

15 — COUNTER

18 — RADIO COMMUNICATION PART

17 — OPERATION PART

19 — CPU

16 — DISPLAY

FIG.2

16 DISPLAY

11 TREADMILL

17 OPERATION PART

10

FIG.3

100

11 TREADMILL

10

COMMUNICATION
NETWORK

20

FIG.4

35 SWITCH

31 BELT

33 ROLLER

32 MOTOR

14 ENCODER

FIG.5

$M \cdot g \cdot \sin \theta$

20

$M \cdot g$

θ

M : ROBOT MASS
g : ACCELERATION OF GRAVITY
θ : ANGLE OF INCLINATION

FIG.6

VARIABLE RESISTANCE : Ra
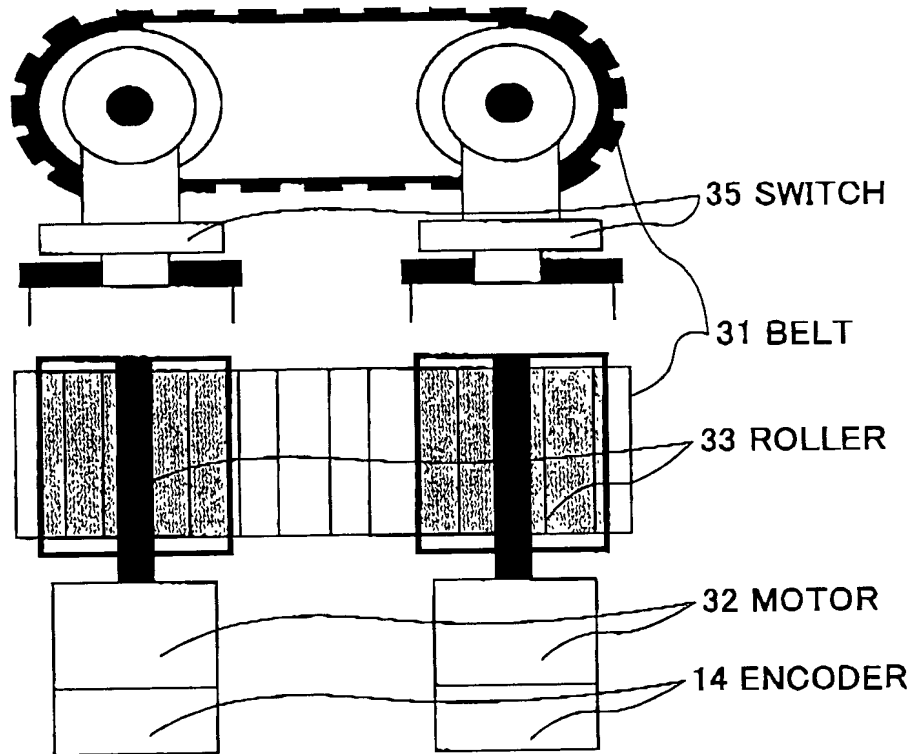
TORQUE : T

40

MOTOR

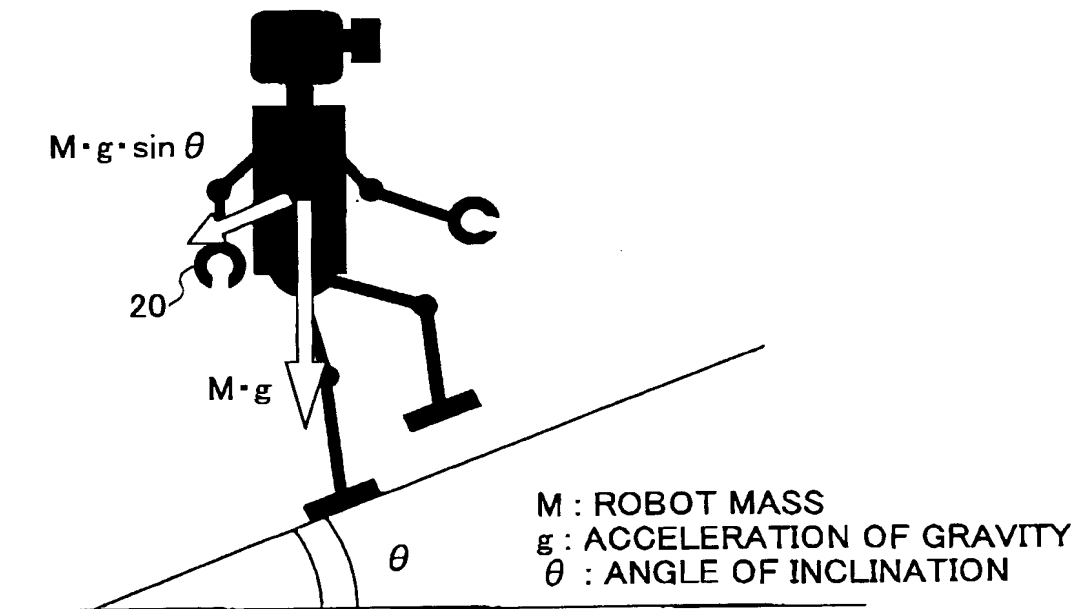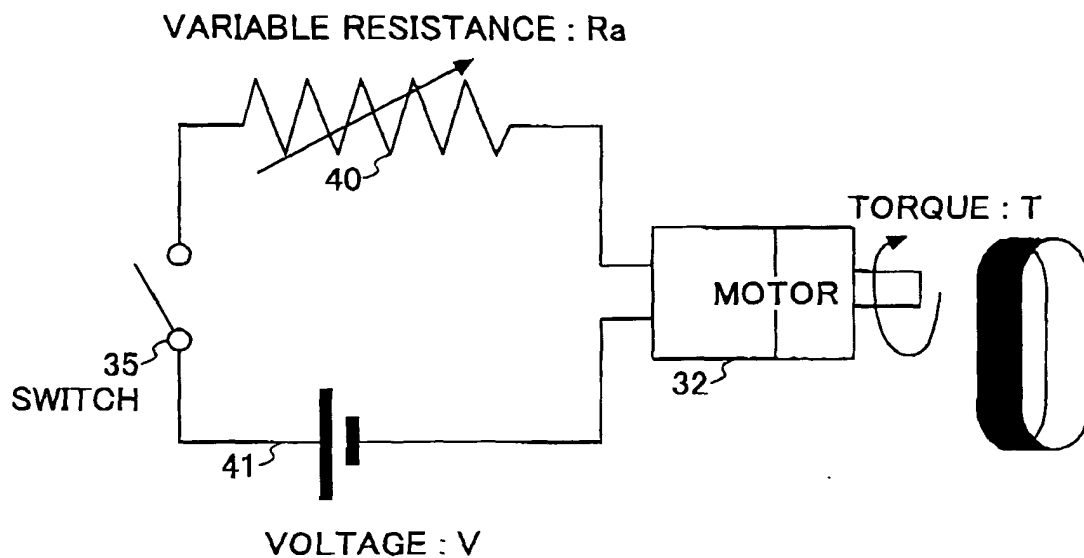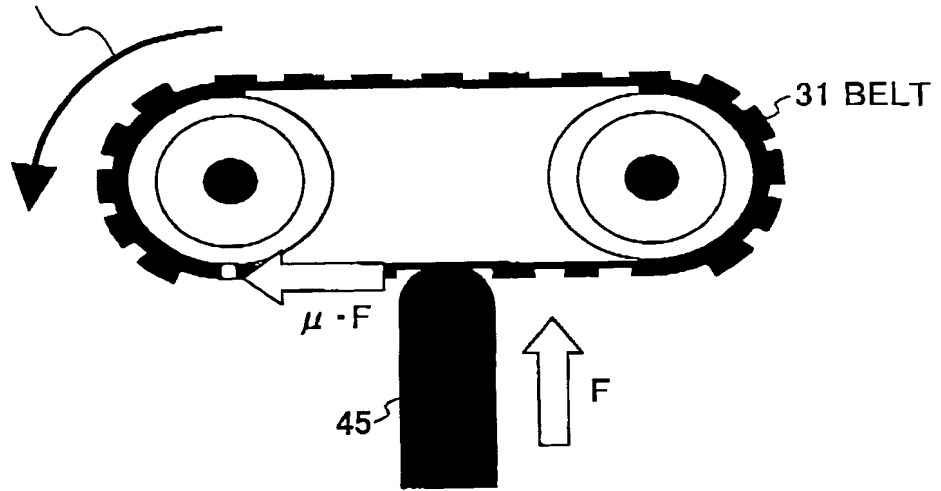35
SWITCH

32

41

VOLTAGE : V

K : COUNTER ELECTROMOTIVE FORCE CONSTANT OF MOTOR
Δl : QUANTITY OF MOTION

$$Ra = \frac{K}{T}(V - K \cdot \omega)$$ $$Ra = \frac{K}{C_0 \cdot M \cdot g \cdot \sin \theta}(V - C_1 \cdot \Delta l)$$

FIG.7

ROTATIONAL DIRECTION

31 BELT

$\mu \cdot F$

45

F

$$\mu \cdot F = C \cdot M \cdot g \cdot \sin \theta$$

FIG.8

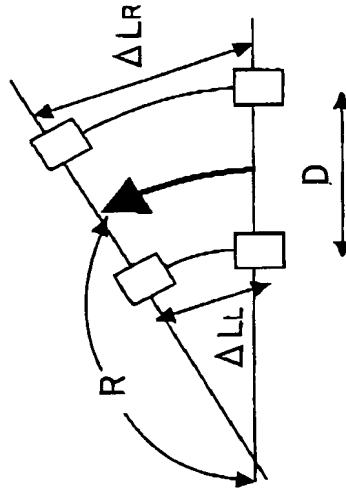$$\text{CURVATURE}: 1/R = \frac{\Delta L_R - \Delta L_L}{\Delta L_R + \Delta L_L} \cdot \frac{2}{D}$$
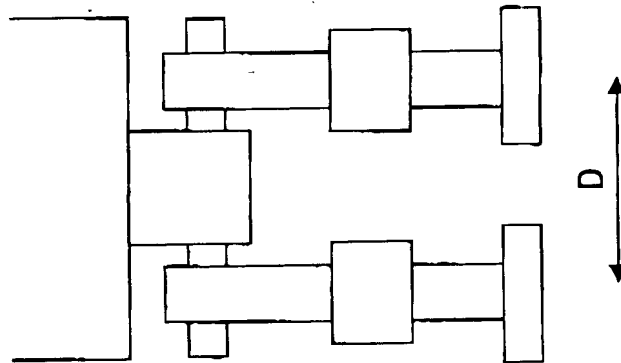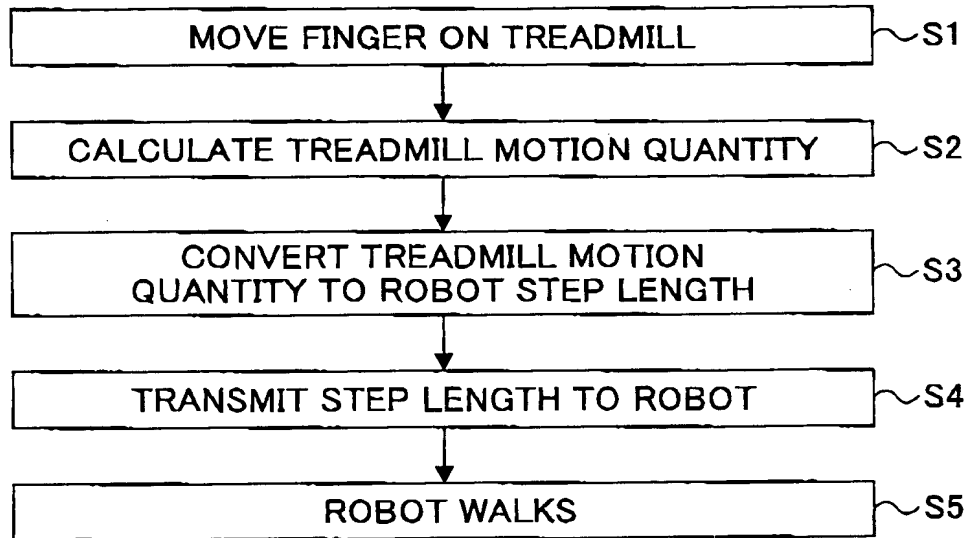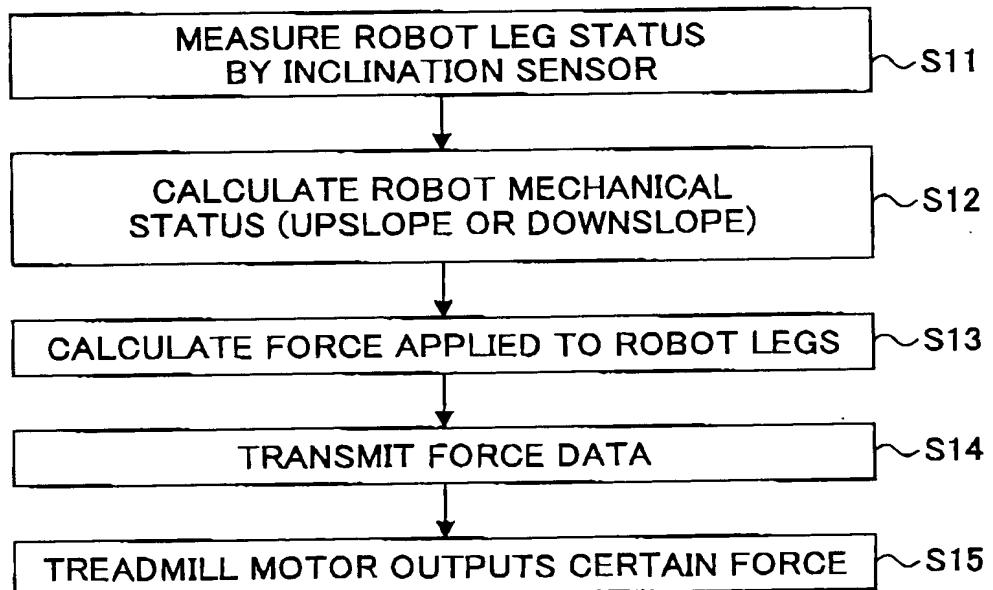
FIG.9

MOVE FINGER ON TREADMILL ⌇S1

CALCULATE TREADMILL MOTION QUANTITY ⌇S2

CONVERT TREADMILL MOTION
QUANTITY TO ROBOT STEP LENGTH ⌇S3

TRANSMIT STEP LENGTH TO ROBOT ⌇S4

ROBOT WALKS ⌇S5

FIG.10

MEASURE ROBOT LEG STATUS
BY INCLINATION SENSOR ⌇S11

CALCULATE ROBOT MECHANICAL
STATUS (UPSLOPE OR DOWNSLOPE) ⌇S12

CALCULATE FORCE APPLIED TO ROBOT LEGS ⌇S13

TRANSMIT FORCE DATA ⌇S14

TREADMILL MOTOR OUTPUTS CERTAIN FORCE ⌇S15

FIG.11

ROLLER
50

ONE-HAND OPERATION

TWO-HAND OPERATION